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Disaster Mitigation

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The definition of mitigation includes a wide variety of measures taken before an event occurs that will prevent illness, injury, and death and limit the loss of property. Taking steps to mitigate potential hazards has taken on increasing favor in disaster preparedness circles, particularly in the international arena, where the pursuit of disaster risk reduction (DRR) and disaster risk management (DRM) is emphasized above efforts focused simply on disaster event response. The absolutely stunning loss of life, illnesses, injury, psychological impact, displacement from home and community, and social and financial consequences of a disaster, coupled with its disproportionate impact on the already disadvantaged, makes it imperative to fully implement the best principles and practices of disaster mitigation.¹ These principles and practices fall into two types:

1. *Disaster Risk Reduction (DRR)* aims to reduce the damage caused by natural hazards like earthquakes, floods, droughts, and cyclones, through the ethic of prevention.²
2. *Disaster Risk Management (DRM)* includes management activities that address and seek to correct or reduce disaster risks that are already present.³

HYOGO FRAMEWORK FOR ACTION

The Hyogo Framework for Action⁴ offers guiding principles, priorities for action, and practical means to achieve disaster resilience for vulnerable communities. Priorities for action include the following:

1. Ensure that DRR is a national and local priority with a strong institutional basis for implementation
 2. Identify, assess, and monitor disaster risks and enhance early warning
 3. Use knowledge, innovation, and education to build a culture of safety and resilience at all levels
 4. Reduce the underlying risk factors
 5. Strengthen disaster preparedness for effective response at all levels
- Although the primary emphasis on the Hyogo Framework is natural disasters, the processes discussed and framework for community resilience and partnerships have application to all types of hazard responses.

ENGAGING THE WHOLE COMMUNITY

The Federal Emergency Management Agency (FEMA) reinforces the importance of engaging “not only FEMA and its federal partners, but also local, tribal, state and territorial partners; non-governmental faith-based and nonprofit organizations, and private sector industry; to individuals, families and communities, who continue to be the nation’s most important assets as first responders during a disaster.” Engaging local communities and a diverse set of partners ensures that the “unique and diverse needs of a population” are met and helps communities become more resilient after a disaster.⁵

Some specific medical response mitigation activities commonly include the following:

- Conduct health care facility and community hazard vulnerability analysis
- Conduct general efforts to support community resistance and resiliency
- Recruit and support staff (local citizens are more likely to support response and recovery efforts closer to home)
- Establish Memorandums of Understanding, which outline legal protections and authorities with local and regional nongovernmental organizations (NGOs), public agencies, faith-based groups, and private partnerships
- Develop training and educational activities to maintain skills and motivate staff
- Conduct organized Homeland Security Exercise and Evaluation Program (HSEEP) exercises
- Structure social media and other nontraditional methods of community outreach to communicate with individuals before, during, and after a disaster
- Implement technologies to support patient tracking, communications, data collection, and command and control.

INTRODUCTION OF MITIGATION IN THE UNITED STATES

It is of critical importance that emergency planners incorporate the basic elements of mitigation and have the authority and resources to incorporate these changes into their agency, organization, facility, or community. Emergency planners should have a working knowledge of the concepts of mitigation through their experience in natural disasters over the years. The federally mandated transition to the all-hazards approach for disaster event planning has also given a new perspective on mitigation.⁶ Although it is not necessary to redefine mitigation, it is essential to understand how the scope and complexity of mitigation, risk reduction, and risk management strategies have evolved as the United States adapts to new threats.

For example, what measures can be taken in advance to protect the population and infrastructure from an earthquake, flood, ice storm, pandemic, or improvised nuclear device? As with each mass casualty event, the answers to this question are location-specific and heavily dependent on the circumstances surrounding the event. However, a common understanding of the goals and concepts of mitigation along with knowledge of its policy history and current practices will help a community develop mitigation strategies that are both locally effective and economically sustainable.

This chapter illustrates how mitigation strategies have evolved, outlines key historical elements of U.S. mitigation policy, highlights critical

current mitigation practices, and describes common pitfalls that can hamper mitigation efforts. The realm of mitigation planning is far-reaching and complex. Therefore the emphasis of this chapter is on the continuity of medical care during a mass casualty event within a community.

GOALS AND CONCEPTS OF MITIGATION

In the simplest of terms, mitigation means to lessen the possibility that a mass casualty event can cause harm to people or property. However, this definition covers a broad range of possible activities. For example, an effort to ensure that essential utilities, such as electricity and phone service, continue to be available throughout a natural disaster is very different from efforts to minimize the economic damage of postdisaster recovery from a major flood or attempts to educate the public on how to reduce their risk of exposure during a pandemic.

Mitigation strategies can range from focusing exclusively on “hardening” to focusing more on resiliency. Hardening of targets is best described as measures that are taken to physically protect a facility, such as bolting down equipment, securing power and communications lines, installing backup generators, placing blast walls, or physically locking down and securing a facility. Mitigation through hardening has only limited use in systems or facilities such as hospitals where open access to the surrounding community is the hallmark of their operations. In these circumstances, a resilient system capable of flexing to accommodate damage and the ability to maintain or even expand current operations will make that system ultimately more secure. These efforts are solidly based within the community and their importance is emphasized by policy and supporting documentation from Presidential Policy Directive (PPD)-8: National Preparedness, FEMA, the Assistant Secretary of Preparedness and Response (ASPR) in the Department of Health and Human Services, the U.S. Centers for Disease Control and Prevention (CDC), the National Association of County and City Health Officials (NACCHO), and The Joint Commission (formerly the Joint Commission on Accreditation of Health Care Organizations, or JCAHO).

Mitigation through resiliency also has limitations. In many cases, hardening structures is most appropriate, particularly when many citizens may be quickly affected without prior notice or warning. This may include hardening structures in earthquake zones, protecting and monitoring the food chain and drinking water systems, and physically securing and protecting nuclear power plants. In these cases, resiliency may come too late to prevent illness and death in large numbers of patients, and planners should target hardening to whatever degree is practically and financially feasible.⁷ The threats of nuclear, radiological, chemical, and biological attacks present new challenges for emergency planners. The potentially covert nature of the attacks, the wide variety of possible agents (including contagious agents), and soft civilian targets make planning efforts exponentially more difficult than in the past. This complexity has also eroded the distinction between mitigation and response activities.

Although it is never possible to mitigate or plan responses for all contingencies, we do know that there is a basic common response framework. This framework includes coordination, communication to enable interagency information sharing, and flexibility to rapidly adapt emergency plans to different situations.^{8,9}

RECENT HISTORICAL PERSPECTIVE

Traditionally, mitigation in the United States has focused on natural disasters; however, early mitigation planning against human-made disasters included civilian fallout shelters and the evacuation of target cities if a nuclear attack was imminent. FEMA states:

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking action *now*—before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk).¹⁰ Risk Reduction works to reduce risk to life and property through land use planning, floodplain management, [and] the adoption of sound building practices . . . Mitigation projects that reduce risk include elevating, relocating, or acquiring properties located in floodplains and returning them to open space, and the reinforcing of buildings in earthquake-prone areas.^{10a}

Mitigation begins with local communities assessing their risks from recurring problems and making a plan for creating solutions to these problems and reducing the vulnerability of their citizens and their property to risk.¹¹ However, since the mid-1990s, mitigation planning has become increasingly more complex. Terrorist attacks, industrial accidents, and new or reemerging infectious diseases are just a few of the threats that have started to consume more planning time and resources. The growing scope of threats that must be addressed in mitigation strategies challenges all aspects of planning and response at all levels of government.^{12–14}

The importance of sharing intelligence information, for example, at the earliest possible stage of a terrorist attack, is recognized in national policy as a critical mitigation asset. Fusion centers have been implemented in jurisdictions across the United States.^{15,16} It is imperative that first responders and hospitals receive notification at the earliest indication of a contagious biological attack. Early notification allows state, regional, and local communities to implement appropriate responses that provide isolation, treatment, prophylaxis, and stockpiling and staging of federal resources, which, when rapidly implemented, could contain a potentially widespread event. This intelligence sharing must become a larger part of mitigation efforts aimed at also limiting the impact of natural and human-made disasters. The elevated status of intelligence within the National Incident Management System (NIMS) establishes the importance of early and effective intelligence sharing. The challenge is to establish these sharing relationships before a disaster by incorporating them into an ongoing hazard monitoring process, drills, exercises, and day-to-day activities to ensure that this critical resource is operational when needed to mitigate the consequences of a disaster.¹⁷ A similar analogy can be made with the early warning given to the medical community when a surveillance system detects an unusual cluster of illnesses, which triggers an investigation leading to increased awareness, training, laboratory recognition, and possible identification of a sentinel case long before the initial diagnosis may be confirmed at a physician’s office or health care facility.

The Disaster Mitigation Act of 2000 (DMA-2000)¹⁸ emphasized the importance of mitigation planning within communities by authorizing the funding of certain mitigation programs and by involving the Office of the President. Under DMA-2000, the President may authorize funds to communities or states that have identified natural disasters within their borders and have demonstrated public–private natural disaster mitigation partnerships. DMA-2000 promotes awareness and education by providing economic incentives for states, local communities, and tribes.

DMA-2000 Federal assistance priorities include the following:

- Forming effective community-based partnerships for hazard mitigation purposes
- Implementing effective hazard mitigation measures that reduce the potential damage from natural disasters
- Ensuring continued functionality of critical services
- Leveraging additional nonfederal resources in meeting natural disaster resistance goals
- Making commitments to long-term hazard mitigation efforts to be applied to new and existing structures

This important legislation sought to identify and assess the risks to states and local governments (including Indian tribes) from natural disasters. The funding would be used to implement adequate measures to reduce losses from natural disasters and to ensure that the critical services and facilities of communities would continue to function after a natural disaster.

Further evidence of the expanding complexity of mitigation efforts can be found in the Terrorism Insurance Risk Act of 2002. This act fills a gap within the insurance industry, which typically does not provide insurance coverage for large-scale terrorist events. The federal government promptly passed this act in the wake of the September 11, 2001, attacks to address concerns about the potential widespread effect of insured losses due to terrorism on the economy. The act provides a transparent shared public-private program that compensates insured losses as a result of acts of terrorism. The purpose is to “protect consumers by addressing market disruptions and ensure the continued widespread availability and affordability of property and casualty insurance for terrorism risk; and to allow for a transitional period for the private markets to stabilize, resume pricing of such insurance, and build capacity to absorb any future losses, while preserving State insurance regulation and consumer protections.”^{19,20} Now, effective mitigation planning is expected to include many different aspects of private industry.

Private industry is a critical partner; its involvement may range from being a potential risk to the community, such as a chemical plant, to providing assistance in responding to an event. This is especially true in the area of health care; most health care in the United States is provided by the private sector. It is important to note that the National Fire Protection Association (NFPA) recently released NFPA 1600, Standard on Disaster/Emergency Management and Business Continuity Programs, 2013 edition. This standard establishes a common set of criteria and best practices to help local, regional, and national governments, agencies, and organizations plan for disaster management, emergency management, and business continuity. Planners may use these criteria to assess or develop programs or to respond to and recover from a disaster.²¹

Although mitigation planning has become an essential feature of nearly every industry and institution in the wake of 9/11, health care settings are disproportionately affected by new challenges and complexities in mitigation. The severe acute respiratory syndrome (SARS) outbreak shook the foundation of mitigation and prevention in health care when health care workers and first responders in China and Canada died in 2003 after caring for patients infected with the SARS virus. Access to several Toronto area hospitals was significantly limited for several months because of illness, quarantined staff, and concerns about contamination. The economic costs to the city of Toronto were in the billions of dollars. Hospitals and their communities were thrown into a complex mitigation and prevention crisis. Like SARS, the steady spread of Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia since 2012 poses similar threats and has disproportionately affected health care workers, who remain most vulnerable to contagious emerging and reemerging infectious diseases.

The Association of State and Territorial Health Officials (ASTHO) released specific guidelines and checklists to help prepare states and communities for a possible outbreak.²² Pan-influenza planning closely parallels SARS planning, with considerable effort toward preventive vaccination of the population and emphasis on protecting health care workers.²³ Effective strategies were learned during the Toronto SARS outbreak, although it was definitely a “learn-as-you-go-along” situation. The most effective mitigation strategies to prepare for the consequences of an outbreak would be to plan for the home quarantine of patients, establish public information strategies to reduce public

concern, close affected facilities until conditions permit their safe reopening, plan for a coordinated information and command and control center, and have preestablished protocols and procedures in place to protect the health of health care workers and first responders.²⁴

Vaccination is an essential component of hospital and community mitigation planning. During the fall of 2002, the U.S. government requested that all states prepare for a smallpox attack. The preparations called for each state to present plans to vaccinate all persons within the state, within a 10-day period, starting with health care workers.²⁵ Each facility and community needs to look at the risk of a disease, the effect of vaccination on health care workers, and the ability to maintain continuity of care. One outcome of the 2009 H1N1 pandemic was that several organizations, including the Society for Healthcare Epidemiology of America (SHEA), the Association for Professionals in Infection Control and Epidemiology (APIC), and the Infectious Disease Society of America (IDSA) recommended that health care workers be mandated to receive yearly influenza vaccinations, which helps to minimize the risk that they will transmit influenza to high- and low-risk patients and bring influenza home to their families. If properly informed and vaccinated, health care workers could respond and treat patients without risk to themselves or their families. The availability of a vaccine and the ability to mass-vaccinate the majority of the population should be considered in all community response plans. The plans for both SARS and pan-influenza now need to address the availability and possible stockpiling of antiviral agents as well as procedures for mass vaccination of the population, if a vaccine were to become available.

Nonpharmaceutical interventions (NPIs) are also of critical importance in preventing the spread of pandemic illnesses such as the H1N1 pandemic of 2009. Communities can enact policies promoting NPIs that reduce the risk of spreading disease, such as encouraging flexible sick leave and offering telework for employees, closing schools temporarily, and encouraging those who are ill to stay home until they are well.²⁶ Social media, such as a local health department’s Twitter or Facebook account and the CDC’s Flu Activity & Surveillance webpage,²⁷ help individuals stay informed on the status of an outbreak and provide recommendations tailored to community members or populations at higher risk for complications.

We have learned from the many earthquakes, tornadoes, hurricanes, fires, and floods that the United States has experienced, but it is extremely difficult to plan for massive terrorist and natural events that happen without notice and can quickly overwhelm communities, states, and even the nation. These historical events, policy developments, and shifts in public attention have created a very complex planning and operating environment. The next section of this chapter addresses some of the key current practices that mitigation strategists should consider.

CURRENT PRACTICE

Current mitigation strategies are as varied as the circumstances in which they are formed. This section illustrates the impact of mitigation through a comparison of responses to two earthquakes that were broadly separated both in geography and degree of community preparedness. These examples are followed by a discussion of critical elements of mitigation and risk reduction practice in three broad categories: coordination with other organizations and jurisdictions, hospital concerns, and mitigation strategies based in community health promotion and surveillance.

The first step for protecting communities and their critical facilities against earthquakes is a comprehensive risk assessment based on current seismic hazard mapping. This determination of location should also include the assessment of underlying soil conditions, the potential

for landslides, and other potential hazards.²⁸ Communities located on seismic fault lines must also develop and enforce strict building codes.

After the Bam, Iran, earthquake in 2003, a large section of the city looked at first glance like a burned forest with only the bare trees left standing. It soon became clear that these “trees” were steel vertical beams standing upright in mounds of concrete rubble. In comparison, after the Northridge, California, earthquake in 1994, many of the buildings were structurally compromised but did not collapse upon their occupants. Undoubtedly, this was the result of the strict building codes and enforcement throughout the state of California. For the victims of the Bam earthquake, the most important lifesaving measures might have been the development and enforcement of strict building codes.²⁹ Building codes are minimum standards that protect people from injury and loss of life from structural collapse; they do not ensure that normal community functioning might continue after a significant event.³⁰

The structural issues, generator failures, flooding, and sewage problems experienced by hospitals during hurricanes Sandy and Katrina were widely and dramatically displayed by the press across the world. With over half of the 16,000 hospitals in Latin America and the Caribbean in high-risk disaster zones, the Pan American Health Organization (PAHO) has developed extensive guidance for hospital preparedness.³¹

Structural protection of facilities requires the active role of qualified and experienced structural engineers during planning, construction, remodeling, and retrofitting. The immediate response of a structural engineer after a disaster is to assess building damage and to assist in determining the need for evacuation and the measures needed to ensure continuity of function. Extensive analysis of seismic data taken during an earthquake and compared with subsequent building damage has given structural engineers valuable information on structural failures of buildings. This information allows communities to rebuild with better and stronger facilities.³²

The following measures to protect the structural integrity of a facility should be in place before an incident³³:

- A contract with a structural engineering firm to participate in planning, construction, retrofitting, and remodeling
- A contractual agreement guaranteeing the response, after an event, of a structural engineer (with appropriate redundancy) to ensure structural stability, assess the need for evacuation, and take additional measures to ensure the continuity of essential functions
- An inventory and classification of all buildings
- A vulnerability assessment
- Strict code compliance
- Determination of public safety risks
- Determination and prioritization of structural reinforcement needs
- Lists of vulnerable structures for use in evacuation and damage assessment.

Extensive resources and technical assistance for structural earthquake protection are available on the Internet. FEMA’s website itemizes these resources into three major categories: earthquake engineering research centers and National Earthquake Hazards Reduction Program-funded centers, earthquake engineering and architectural organizations, and codes and standards organizations.³⁴ FEMA has also released the Risk Management Series publications, which provide very specific guidance to architects and engineers about protecting buildings against terrorist attacks.³⁵ The Institute for Business and Home Safety is also an excellent source of incident-specific information for both businesses and homes.³⁶

The protection of facilities from earthquake damage also involves protecting the facility’s nonstructural elements so that the fundamental structure of the building and operations are not compromised (Box 27-1). Primary damage to nonstructural elements may be the result

BOX 27-1 Nonstructural Elements

- Cabinets
- Compressed gas tanks
- Fuel tanks
- Generators
- Equipment and supplies
- Signs and pictures
- Electrical lines
- Communication and information technology lines
- Bookshelves
- Windows
- Electrical fixtures
- Storage containers
- Hazardous materials
- Lockers
- Building parapets and facings
- Computer and IT networks

of overturning, swaying, sliding, falling, deforming, or internal vibration on sensitive instruments. Relatively simple measures that do not require a structural engineer may be taken to prevent damage to or from nonstructural elements. These measures may include fastening loose items and structures, anchoring top-heavy items, tethering large equipment, or using spring mounts. Other elements, such as stabilizing a generator from vibration damage by placing it on spring mounts or from sliding damage by having slack in attached fuel and power lines, may require the assistance of an engineer.

Hospitals and other medical care facilities are especially vulnerable to damage from nonstructural elements. Consider the placement of routine medical care items such as intravenous poles, monitors and defibrillators, and pharmaceutical agents and medical supplies on shelves. Loss of emergency power to key services, such as computed tomography scanners, laboratory equipment, electronic medical records, and dialysis units, may also significantly affect the continuity of medical care.^{37,38} Loss of generator power may be due to failure of crossover switches, loss of cooling, or loss of connection of power and fuel lines. A process for the continual review of the power needs of new and critical equipment should be a part of a hospital’s emergency planning process.

Cooperating with the federal government and understanding the resources, structure, and timeframe within which federal resources are available are critical to appropriate mitigation planning.³⁹ NIMS and the National Response Plan are described elsewhere in this book. Each document describes in detail the organizational structure and response authority of the federal government in the time of a disaster.⁴⁰ Health care organizations, communities, and states are mandated to ensure that their strategies for mitigation, response, and recovery are developed in coordination with these national models. Homeland Security Presidential Directive (HSPD) 5 mandated that by fiscal year 2005, “the Secretary shall develop standards and guidelines for determining whether a State or Local entity has adopted the NIMS,”⁴¹ and all mitigation and risk reduction strategies should be designed accordingly.

In addition to efforts to coordinate with federal plans, mitigation strategists must also build functional partnerships within communities and across jurisdictional lines. This point has been emphasized in several recently published planning guides.^{42–44} These guides help hospitals and their communities plan for mass casualty events by incorporating key features of planning, risk assessment, exercises, communications, and command and control issues into functional and operational programs.

Hospitals also present special challenges. HSPD 8 specifies that hospitals qualify as first responders.⁴⁵ As such, they have important mitigation activities to consider. What does mitigation mean for a hospital? In the current threat environment, it means minimizing the impact of an event on the institution and ensuring continuity of care.

Accessibility to the public 24 hours a day, 7 days a week has been a hallmark of hospital emergency care. However, one of the most important mitigation strategies a hospital can adopt is the ability to limit and control access to patients and families during the time of a mass casualty or a hazardous materials event. Additionally, facilities must have plans and the ability to decontaminate patients, protect essential staff and their families, handle a surge of patients with complementary plans for the forward movement of patients to surrounding areas, set up alternative treatment facilities within the community, train staff in early recognition and treatment of illness or injury related to weapons of mass destruction, and ensure continuity of care and financial stability during and after an event.

Although hospitals will always form the cornerstone for medical treatment of patients during mass casualty events, best practices for hospitals must now also incorporate health care resources within the community.⁴⁶ Hospitals will have to work with other first responders within the community to conduct drills and exercises that realistically test the whole hospital's ability to respond to a mass casualty event.⁴⁷ Hospitals also will have to ensure that staff members have the proper training to complete hazard vulnerability assessments⁴⁸ and to set up and staff outpatient treatment facilities to ensure continuity of care.⁴⁹ Even with very careful planning, most communities will be overwhelmed for the first minutes to hours or possibly days after a massive event, until an effective and prolonged response can occur. Communities must also look at the continuity of medical care as a community-wide issue and not just emphasize the hospital or emergency medical services aspects of medical care. The loss of community-based clinics, private medical offices, nursing homes, dialysis units, pharmacies, and visiting nurse services can significantly increase the number of patients seeking care at hospitals during a mass casualty event. Risk communication and education specifically aimed at protecting the affected population can help prevent surges of medical patients.⁵⁰

Hospitals now have enormous community responsibilities in terms of preparing for and mitigating mass casualty events. Hospitals in hurricane, flood, earthquake, and tornado zones have prepared for many years against these threats. However, a pattern of repeated systems failures within hospitals continues and includes communications and power loss, with additional physical damage to the facility.⁵¹ To prevent such failures, hospitals need to recognize that mitigation and risk reduction planning must approach a level of detail and logistical support that parallels military planning.

Surveillance is another key mitigation strategy for hospitals and public health emergencies. Early recognition of sentinel cases in biological events can significantly affect the outcome, particularly in contagious events. States are funded and required to participate in the surveillance programs mandated in CDC and Health Resources and Services Administration (HRSA) guidelines.^{52,53} The earlier an event is recognized, especially if it involves a contagious disease, the earlier treatment can begin and preventive measures can be taken to prevent the spread of illness to health care workers and responders, as well as the rest of the community. Local and state public health departments are critical to establishing relationships between local providers and their communities. Local, state, and federal public health agencies must ensure that effective surveillance at the community level occurs. These agencies can also assist in awareness-level and personal protection training for hospital staff, emergency medical service employees, and law enforcement first responders.

NEW HAMPSHIRE CRITICAL CARE AND SUPPLEMENTAL OXYGEN PROGRAM (NHCCSOP)

The State of New Hampshire was faced with the task of increasing the state's capacity and capability to provide for critical care and supplemental oxygen during widespread pandemic events or overwhelming local or sub-state regional events. The first phase involved the placement of high-performance, transport-capable ventilators within hospitals and emergency medical services across the state. The decision to place the ventilators with end users accomplished the goals of having the ventilators in the field where they would be readily available and maintained and could be utilized in day-to-day emergent interfacility and intrafacility transports. The supplemental oxygen component of the program provides low-flow oxygen within the community-based alternate care facilities that are supported by state legislation during mass casualty events and public health emergencies. Critical to this effort was state support and legislation as well as the effective use of sub-state public health regions to support planning and command and control response activities. Within the regions, coalitions supporting this effort included a core group of critical partners providing medical control and subject matter expertise and multiple supportive agencies and NGOs. Space included public schools, college facilities, community centers, and NGO facilities. Staff comprised community volunteer groups, the state Metropolitan Medical Response System (MMRS) team, hospitals, private practices, and other practitioners. Supplies included a combination of state-purchased equipment and supplies, with an emphasis on high-priority coordination with state and local vendors for oxygen equipment and supplies. Sustainability, the effective utilization of regionally based and local resources, appears to be an effective strategy for this important capability after a series of HSEEP-certified workshops and exercises across the thirteen regions of the state.⁵⁴

COMMON PITFALLS

Motivating health care facilities to take part in mitigation is one of the largest challenges in disaster medicine. It is always best to take measures beforehand to minimize property damage and prevent injury and death. In the case of hospitals, some preliminary research indicates that four factors affect an institution's motivation to mitigate: influence of legislation and regulation, economic considerations, the role of "champions" within the institution, and the impact of disasters and imminent threats on agenda-setting and policy making. It was discovered during this research that "mitigation measures were found to be most common when proactive mitigation measures were mandated by regulatory agencies and legislation."⁵⁵ Tax incentives, government assistance grants, and building code and insurance requirements may also serve to motivate administrators and decision makers to put the necessary time and effort into mitigation planning.³⁰

The Hospital Preparedness Program (HPP), designed to provide leadership and funding through grants to and cooperative agreements with states, territories, and eligible municipalities to improve surge capacity and enhance community and hospital preparedness for public health emergencies,⁵² has undergone significant cuts over the past few years that threaten to undo progress made in the last decade. HPP appropriations have decreased from \$426 million in FY2010 to \$255 million in FY2014, including a one-third cut in the FY2014 omnibus.⁵⁶ HPP provides financial incentives to ensure that hospitals are able to coordinate, cooperate, and reduce loss of life during an emergency. The program allowed the coalition in Boston to practice two 24-hour disaster simulations involving several area hospitals before the 2013 Boston Marathon Bombing. The planning and efficiency of the

hospitals after the attack were major factors in saving the lives of the 264 individuals injured in the bombings, and there were no additional deaths after the three on-site fatalities.⁵⁷ The loss of an estimated 46,000 state and local public health jobs since 2008⁵⁸ also has the potential to damage the progress made in all-hazards preparedness since 9/11. With little prospect of increased national funding in the immediate future, it is necessary for local communities to develop sustainability strategies to ensure every dollar is well spent in helping their communities prepare for disasters.⁵⁹ The CDC Capability 10: Medical Surge publication encourages the widespread collaboration and allocation of resources in community-wide surge capacity efforts and has been helpful in focusing these efforts in a realistic and operational manner.⁶⁰

CONCLUSION

Extensive mitigation activities are a necessary prerequisite for the response and recovery activities that must follow a large-scale mass casualty event. It is very difficult, as well as disturbing, to plan for the potential number of casualties in the United States that we are preparing for today. We do have the threat of an enemy who will strike within the United States with the purpose of inflicting mass numbers of casualties on the civilian population. We must maintain the perspective that even the smallest chance of such an incredibly devastating event, whether human-made or natural, warrants our full attention. If there is no other motivating factor, the possibility of such an event must suffice. 9/11, SARS, H1N1, the 2013 Boston Marathon Bombing, the anthrax attacks, hurricanes Katrina and Irene, and Superstorm Sandy are all recent events that have impacted a wide range of areas from dense urban to very rural with a wide range of injury, illness, death, and destruction.

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